PORTABLE LIGHTING DEVICE WITH MULTI-ACTIVATION SWITCH

FIELD OF THE INVENTION

The present invention is generally related to portable lighting devices, and more particularly is related to a portable lighting device with multiple light sources and a multi-activation switch.

BACKGROUND OF THE INVENTION

Portable lighting devices are commonly referred to as "flashlights". Flashlights provide a source of light when natural light is inadequate or lack of a utility outlet prevents use of a plug-in lamp. Portable lighting devices generally contain a light source, a switch, and a power source. An electrical circuit electrically couples the light source, switch, and power source. A user activates the light source by activating the switch, which closes the electrical circuit. The switch is generally a mechanism for electrically coupling two posts located on the circuit. Closing the electrical circuit allows current from the power source to flow to the light source. One or more batteries with a negative terminal and a positive terminal are commonly used as the power source. An incandescent light bulb with two terminals is commonly used as the light source. One of the light bulb terminals connects to the positive terminal of the battery and one of the light bulb terminals connects to one of the posts on the switch. The negative terminal on the battery connects to the other post on the switch. By activating the switch, the two posts on the switch are connected. This allows the current to flow through the circuit and power the light bulb.

Portable lighting devices have been attached to key chains to provide quick and convenient access to the portable lighting device. Because keys are normally stored in the pocket of a user, smaller components are desirable allowing the overall portable lighting device to be small. It is also desirable for the portable lighting device to be produced inexpensively.

Thus, a heretofore unaddressed need exists in the industry to address the aforementioned deficiencies and inadequacies.

SUMMARY OF THE INVENTION

In one aspect, the invention features a portable lighting device comprising a power source, a first light source, a second light source, and a switch. A first circuit electrically couples the power source, the switch, and the first light. A second circuit electrically couples the power source, the switch, and the second light source. The switch comprises a first surface portion, a second surface portion, and a third surface portion wherein pressing the first surface portion closes the first circuit, pressing the second surface portion closes the second circuit, and pressing the third surface portion closes both the first and the second circuit.

The switch can have a first locked position that closes the first circuit and a second locked position that closes the second circuit. The switch can also have a first locked position that closes the first circuit and closes the second circuit and a second locked position that closes the second circuit. The first light source and the second light source can be light emitting diodes. The power source can be a battery. A non-conductive housing can hold the power source, the first light source, the first circuit, the second light source, and the second circuit in place. The non-conductive housing can also form the switching mechanism.

Other systems, methods, features, and advantages of the present invention will be or become apparent to one with skill in the art upon examination of the following drawings and detailed description. It is intended that all such additional systems, methods, features, and advantages be included within this description, be within the scope of the present invention, and be protected by the accompanying claims.

BRIEF DESCRIPTION OF THE DRAWINGS

Many aspects of the invention can be better understood with reference to the following drawings. The components in the drawings are not necessarily to scale, emphasis instead being placed upon clearly illustrating the principles of the present invention. Moreover, in the drawings, like reference numerals designate corresponding parts throughout the several views.

FIG. 1 is a perspective view of the portable lighting device.

FIG. 2 is a front view of the portable lighting device.

FIG. 3 is a block diagram illustrating the interaction of components of the portable lighting device.

FIG. 4 is a cross-sectional side view of the portable lighting device with the switch plate in a middle position.

FIG. 5 is a cross-sectional side view of the portable lighting device with the switch plate in a forward position.

FIG. 6 is a cross-sectional side view of the portable lighting device with the switch plate in a backward position.

DETAILED DESCRIPTION

FIG. 1 is a perspective view and FIG. 2 is a front view of the portable lighting device **100**. The portable lighting device **100** contains a first light source **102** and a second light source **104**. A variety of lighting devices can be used as the first light source **102** and second light source **104**, for example, however not limited to, an incandescent light bulb or a Light Emitting Diode (LED). The first light source **102** and second light source **104** can provide the same color of light or each can provide different colors of light.

A switch plate **106** allows the user to activate and deactivate the first light source **102** and the second light source **104**. The switch plate **106** is a top portion of a switch **306**, which is described in more detail in the description associated with FIGS. 3 - 6. In the embodiment shown in FIG. 1, the switch plate **106** is located on the top surface of the portable lighting device **100**. However, it will be apparent that the switch plate **106** can be located in different locations and surfaces of the portable lighting device **100**. The switch plate **106** has a front portion **108**, a back portion **110**, and a middle portion **112**. The user can selectively activate the first light source **102**, the second light source **104**, or both the first and second light sources **102** and **104** by pressing downward on the different portions **108**, **110**, and **112** of the switch plate **106**. When the user presses down on the front portion **108** of the switch plate **106**, the first light source **102** is activated. When the user releases the front portion **108**, the first light source **102** is deactivated. Similarly, a user can activate the second light source **104** by pressing down on the back portion **110**, or respectively release pressure on the back portion **110** to deactivate the second light source **104**. Applying pressure to the middle portion **112** allows the user to activate both the first light source **102** and the second light source **104**. Similarly, the user can deactivate both light sources by releasing pressure on the middle portion **112**.

In addition to temporarily activating the first light source **102** and the second light source **104** by applying continuous pressure downward on the switch plate **106**, the user can also activate the light sources **102** and **104** by sliding the switch plate **106** in a forward direction or backward direction as shown by the arrow in FIG. 1. The user can slide the switch **106** into a forward position (as shown in FIG. 5) or backward position (as shown in FIG. 6). Unlike the transitory position of pressing downward on the various portions **108**, **110**, and **112** of the switch plate **106**, the switch plate **106** remains in either the forward position or the backward position until the user moves the switch. This allows the user to turn either the first light source **102** or the second light source **104** "on" and leave them "on" for extended use without applying continuous pressure to the surface of the switch plate **106**. When the portable lighting device **100** is not in use the switch plate **106** remains in a middle position (as shown in FIG. 4), in which neither the first light source **102**, nor the second light source **104** is activated.

FIG. 3 is a block diagram illustrating the interaction of the components of the portable lighting device **300**. The switch **306** selectively couples the power source **302** to the first light source **102** and the second light source **104**. The power source **302** is described in greater detail in the sections associated with FIGS. 4 - 6.

When the switch plate **106** is in the forward position or the front portion **108** of the switch plate **106** is pressed down, the switch **306** electrically couples the power source **302** to the first light source **102**. This allows current to flow through a first circuit **308**. The first circuit **308** follows an electrical path from the power source **302**, through the switch **306** and the first light source **102**, and back to the power source **302**. When the switch plate **106** is in a backward position or the back portion **110** of the switch plate **106** is pressed down, the switch **306** electrically couples the power source **302** to the second light source **104**. This allows current to

flow through a second circuit **310**. The second circuit **310** follows an electrical path from the power source **302**, through the switch **306** and the second light source **104**, and back to the power source **302**.

When the middle portion **112** of the switch plate **106** is pressed down, the switch **306** electrically couples the power source **302** to the first light source **102** and the second light source **104**. This allows current to flow through the first circuit **308** and the second circuit **310**. The first circuit **308** follows an electrical path from the power source **302**, through the switch **306** and the first light source **102**, and back to the power source **302**. The second circuit **310** allows the current to flow in parallel with the first circuit **308**. The current also follows an electrical path from the power source **302**, through the switch **306** and the second light source **104**, and back to the power source **302**. When the switch plate **106** is in a middle position, both the first circuit **308** and second circuit **310** are open and current is prevented from flowing through either the first circuit **308** or the second circuit **310**.

FIG. 4 is a cross-sectional side view of the portable lighting device **100** with the switch plate **106** in a middle position. The switch plate **106** comprises the front portion **108**, back portion **110**, and middle portion **112** as shown both in FIGS. 1 and 4. The switch plate **106** is slidably coupled to an interior housing **402**. The interior housing **402** can be made of a non-conductive material and is encased by an exterior housing **404**. The exterior housing **404** holds the components of the portable lighting device **100** together. An aperture **418** in the exterior housing **404** allows the switch plate **106** to be accessed by the user and moved into both the forward position and the backward position.

The interior housing **402** and exterior housing **404** can also be constructed as one housing with a top half and a bottom half. In this scenario (not shown), the components can be

assembled within the housing and then the top half and bottom half of the housing can be coupled together. The housing for the portable lighting device **100**, as described in the examples above, are examples used to illustrate possible housings for the portable lighting device **100**. The portable lighting device **100** is not limited to the housing examples described above. A variety of other housing can be used.

The power source **302** is housed within the interior housing. A positive lead **406** from the first light source **102** is electrically coupled to a positive terminal **410** of the power source **302**. A cushiony material, for example but not limited to rubber or foam, presses the positive lead **406** against the positive terminal **410** of the power source **302**. Similarly, a positive lead (not shown) from the second light source **104** is also electrically coupled to the positive terminal **410** of the power source **302**.

A negative lead **408** from the first light source **102** is positioned in-between a negative terminal **416** of the power source **302** and the interior housing **402**. The negative lead **408** from the first light source **102** rests against the interior housing so as not to make unintended electrical contact with a negative terminal **416** of the power source **302**. The negative lead **408** can also be coupled to the interior housing by glue or other fastener to prevent unintended contact with the negative terminal **416** of the power source **302**. When a force is applied to the front portion **108** or middle portion **112** of the switch plate **106**, the interior housing **402** and negative lead **408** are pressed downward against the negative terminal **416** of the power source **302**. This closes the first circuit **308** and activates the first light source **102**. Once the force is released from the front portion **108** or middle portion **112** of the switch plate **106**, the negative lead **408** separates from the negative terminal **416** of the power source **302** and the first circuit **308** is opened.

Similarly, a negative lead **412** from the second light source **104** is positioned in between the negative terminal **416** of the power source **302** and the interior housing **402**. The negative lead **412** from the second light source **104** rests against the interior housing **402** so as not to make unintended electrical contact with the negative terminal **416** of the power source **302**. The negative lead **412** can also be coupled to the interior housing by glue or other fastener to prevent unintended contact with the negative terminal **416** of the power source **302**. When a force is applied to the back portion **110** or middle portion **112** of the switch plate **106**, the interior housing and negative lead **412** are pressed downward against the negative terminal **416** of the power source **302**. Once the force is released from the back portion **110** or middle portion **112** of the switch plate **106**, the negative lead **412** separates from the negative terminal of the power source **302** and the second circuit **310** is opened.

The interior housing **402**, switch plate **106**, the negative lead **408** from the first light source **102**, and the negative lead **412** from the second light source **104** form the switch **306**. Pressing downward on the front portion **108** of the switch plate **106** presses the negative lead **408** from the first light source **102** into contact with the negative terminal **416** of the power source **302**, thereby completing the first circuit **308**. Similarly, pressing downward on the back portion **110** of the switch plate **106** presses the negative lead **412** from the second light source **104** into contact with the negative terminal **416** of the power source **302** thereby completing the second circuit **310**. Pressing downward on the middle portion **112** of the switch plate **106** presses the negative lead **408** from the first light source **102** and the negative lead **412** from the second light source **104** into contact with the negative terminal **416** of the power source **302**, thereby completing the first circuit **308** and the second circuit **310**.

A front nub **426** on a bottom portion of the switch **306** and a back nub **432**, also located a bottom portion of the switch **306** hold the switch **306** in position. When the switch **306** is in the middle position (as shown in FIG. 4), the front nub **426** and a front notch **428** prevent the switch **306** from sliding into the forward position (as shown in FIG. 5) until the user applies a frontal force to the switch plate **106**. Similarly, the back nub **430** and a back notch **432** prevent the switch **306** from sliding into the backward position (as shown in FIG. 6) until the user applies a backward force to the switch plate **106**. When the switch is in the middle position neither the negative lead **408** from the first light source **102** nor the negative lead **412** from the second light source **104** are in contact with the negative terminal **416** of the power source **302**. Both the first light source **102** and second light source **104** are "off". The user may still activate the light sources **102** and **104** by applying and maintaining a downward force to the switch plate **106**. If the user desires to activate the first light source **102** without maintaining a downward force on the front portion **108** of the switch plate **106**, the user can slide the switch plate **106** in a forward position (as shown in FIG. 5).

FIG. 5 is a cross-sectional side view of the portable lighting device **100** with the switch **306** in a forward position. The user can slide the switch **306** into the forward position by applying a frontal force on the switch plate **106**. As a result of the frontal force, the front nub **426** rides up and over the front notch **428** and the exterior housing **404** presses the switch **306** against the interior housing **402**. The extra space necessary for the front nub **426** to rest on top of the front notch **429** presses the negative lead **408** from the first light source **102** into contact with the negative terminal **416** of the power source **302**, thereby completing the first circuit **308**. The front notch **428** holds the front nub **426** of the switch plate **106** in place without the user applying any force to the switch **306**. The first light source **102** remains "on" until the user applies a

backward force to the switch plate. Once the user supplies sufficient force to slide the front nub **426** out of the front notch **428**, the switch **306** slides back into the middle position. The negative lead **408** then separates from the negative terminal **416** of the power source **302** and the first light source **102** is turned "off".

FIG. 6 is a cross-sectional side view of the portable lighting device **100** with the switch **306** in a backward position. The user can slide the switch **306** into the backward position by applying a backward force on the switch plate **106**. As a result of the backward force, the back nub **430** rides up and over the back notch **432** and the exterior housing **404** presses the switch **306** against the interior housing **402**. The extra space necessary for the back nub **430** to rest on top of the back notch **432** presses the negative lead **412** from the second light source **104** into contact with the negative terminal **416** of the power source **302,** thereby completing the second circuit **310**. The back notch **432** holds the back nub **430** of the switch **306** in place without the user applying any force to the switch plate **106**. The second light source **104** remains "on" until the user applies a frontal force to the switch plate **106**. Once the user supplies sufficient force to slide the back nub **430** out of the back notch **432**, the switch **306** slides back into the middle position. The negative lead **412** then separates from the negative terminal of the power source **302** and the second light source **104** is turned "off".

In another example of the portable lighting device **100**, a variety of color combinations can be used for the light sources **102** and **104**. The portable lighting device **100** with different colors of light sources allows a user to use different colors of light for different applications. For example, the first light source **102** may emit red light, while the second light source **104** may emit a white light. When using the portable lighting device **100** in an application where the user does not wish to disturb others, the user may wish to activate only the first light source **102** and

take advantage of the high dispersion of the red light emitted by the first light source **102**. However, in other applications when the user desires to better identify an item in the dark, the user may wish to emit the white light of the second light source **104**. The light sources **102, 104** are not limited to red and white. Light sources with a variety of colors, for example but not limited to, red, blue, green, turquoise, yellow, purple, and white, can be used with the portable lighting device **100**. In addition, the first light source **102** and second light source **104** are not limited to the combination of red and white. A variety of color combinations can be used for the light sources **102, 104**.

For example, the portable lighting device **100** may have the first lighting source **102** and the second lighting source **104** providing the same color of light. In this example, the user can select different amounts of the light emitted for different applications. A user may desire a modest amount of light and activate only the first light source **102**. In another situation, the user may desire more light and select to activate both the first light source **102** and the second light source **104**.

It should be emphasized that the above-described embodiments of the present invention are merely possible examples of implementations, merely set forth for a clear understanding of the principles of the invention. Many variations and modifications may be made to the above-described embodiments of the invention without departing substantially from the spirit and principles of the invention. All such modifications and variations are intended to be included herein within the scope of this disclosure and the present invention and protected by the following claims.